Venous air embolism during air arthrogram of hip in an infant with arthrogryposes multiplex congenita

A 4-month-old (4.5 kg) infant who was born preterm at 34 weeks of gestation, and diagnosed with arthrogryposes multiplex congenita, presented with bilateral development dysplasia of hip (DDH) and bilateral congenital dislocation of knee (CDK). She was initially managed using Pavlik Harness; but as the hip dislocations were not reducible, she was scheduled for bilateral arthrogram of hip, bilateral adductor tenotomy, bilateral quadricepsplasty and bilateral femoral osteotomy.

Preoperative clinical evaluation by an anaesthesiologist and a paediatrician ruled out presence of any congenital cardiac, respiratory and neuromuscular anomalies. Airway examination revealed no visible facial anomaly. The investigations (complete hemogram, renal function test and chest X-ray) were within normal limits. The patient was accepted for surgery as ASA Grade 2 physical status. Informed consent for anaesthesia and caudal epidural analgesia was obtained. Anaesthesia was induced with fentanyl, propofol and atracurium; airway was secured with number 3 uncuffed endotracheal tube and anaesthesia maintained with sevoflurane, oxygen and nitrous oxide, to maintain a MAC of 0.8. Caudal epidural block was performed with 22 G hypodermic needle and 2.5 ml of 0.25% bupivacaine. Intra-operative monitoring was carried out using ECG, pulse oximetry, NIBP and $ETCO_2$.

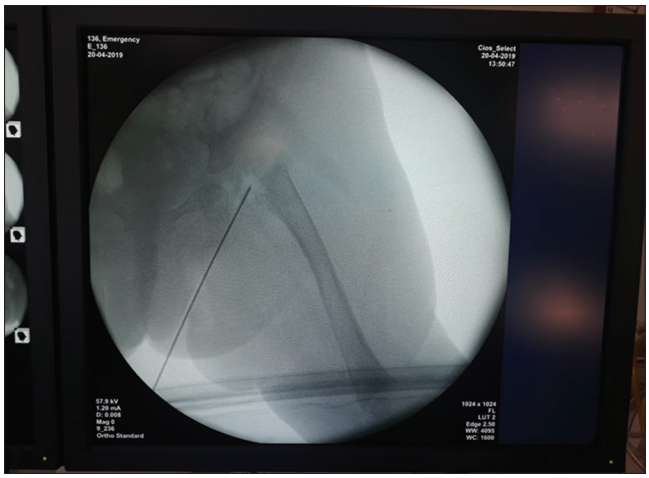

Figure 1: Air arthrogram

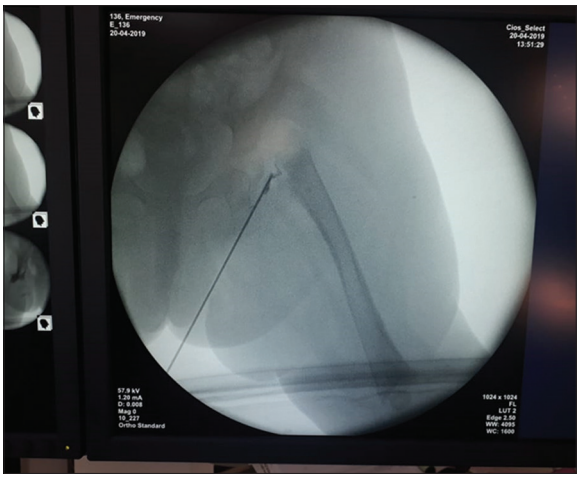

Figure 2: Dye arthrogram

Patient was positioned supine with legs adducted and externally rotated at hip joint and an air arthrogram was performed using 1 ml of air through a 22 G spinal needle, after ensuring negative aspiration [Figure 1]. Arthrogram of the left hip was uneventful. Immediately following air injection in the right hip, a sudden fall in end-tidal CO_2 from 32 to 8 mmHg and in SPO_2 from 100 to 30% was observed. Heart rate decreased from 135/min to 60/min. The surgeon was informed, and the procedure stopped. 100% oxygen was given, and inhalational agents were switched off. Patient was given a head low and left lateral decubitus position followed by an intravenous fluid bolus of 20 ml. Within 2 minutes, the end-tidal CO_2 increased to 25 mmHg and SPO_2 to 92% and to 100% in 10 minutes. No pharmacological intervention was required. As the patient improved clinically a central venous access was not obtained. Once haemo dynamically stable, the surgery was continued. At the end of the procedure, neuromuscular blockade was reversed, and the trachea was extubated. Post-operative evaluation did not reveal any neurological deficit.

Hip arthrography is used in patients with DDH to evaluate the factors responsible for DDH. Air is occasionally injected instead of dye, e.g., in patients with dye allergy or compromised kidney function. Infants are susceptible to developing air embolism[1-4] even with the use of a small amount (<5 ml) of air [Figure 2]. Anaesthetists should be aware of this possibility and allow use of minimum amount of air. Air embolism is a disastrous complication and can be potentially fatal especially in children with cardiac septal defects. Therefore, in a child with multiple skeletal anomalies posted for a procedure with possibility of air embolism, a thorough investigation of cardiovascular system including a preoperative echocardiography should be done. In case of any anomalies, radio opaque dye can be used or alternative methods to delineate the hip anatomy for correction of DDH should be considered.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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